Maine Low-Profile Groundline Area Proposal

Submitted to the Atlantic Large Whale Take Reduction Team

Prepared by Terry Stockwell and Erin Summers
Maine Department of Marine Resources

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Introduction

The Maine Department of Marine Resources (DMR) has long asserted that, due to the rocky and tidal habitat of the Northern Gulf of Maine (NGOM), some flotation is needed in groundlines in order for the Maine lobster fishery to fish safely and efficiently. For the past five years, DMR has collaborated with NOAA Fisheries and the Maine lobster fishing industry to develop and test alternative fishing gear modifications that will reduce the risk of entanglement to large whales while maintaining operational viability for the Maine lobster fishery. In 2006, DMR presented the Atlantic Large Whale Take Reduction Team (ALWTRT) a detailed summary report of a promising low-profile groundline alternative technology. This groundline prototype floated less than one meter from the bottom but was not yet significantly abrasion resistant. Over this past year DMR has worked with rope manufacturers to resolve this operational issue.

The publication of the Final Rules to Amend the Atlantic Large Whale Take Reduction Plan (ALWTRP) by NOAA Fisheries on October 5, 2007 resulted in Maine lobstermen considering alternative options to the way that they configure their fishing gear in order to address the operational challenges of the mandatory sinking groundline requirement. For most, this will include breaking their gear up into smaller trawls, pairs or singles to eliminate or reduce gear loss caused when sinking groundline chafes or gets hung down. DMR highlights that as gear is reconfigured this way it will significantly increase the number of endlines (the vertical line from the trap to the buoy sometimes referred to as vertical lines) in the water column within the NGOM. Consequently, the Final Rules to Amend the ALWTRP will result in a large scale increase in the number of endlines greatly increasing risk to large whales in the NGOM, a risk regarded by some as a larger threat of entanglement to large whales than groundlines. Therefore, it's with a dual purpose that DMR proposes low-profile groundline for use in specific NGOM areas. Maine's lobster fishery will be able to operationally fish with a viable alternative groundline while concurrently reducing the risk of groundline entanglements and preventing the substantial increase of endlines.

Proposed Amendment to the Atlantic Large Whale Take Reduction Plan

See Figure 1

Universal:

- Maintain current technology list in Maine exempted waters (Figure 1 – gray area)

Maine State Waters Sliver – Outside the Exemption Area (Figure 1 – yellow area):

- Maintain current exemption line
- Implementation of low-profile groundlines (specific gravity of 1.02) – maximum 10 fathom length
- Uniquely mark low-profile groundlines
- Sinkrope groundlines in Mt. Desert Rock state waters area
- No singles
- No more than 1 buoy for 5 traps or less
- Adopt sliver waters measures in Maine state rulemaking

Maine Federal Waters (Figure 1 – pink area):

- Implementation of low-profile groundlines in specific rocky and tidal habitat areas (Lobster Zones A-D) – maximum 25 fathom length

Aspects of the Proposed Amendment

- *Maintain the current technology list in all current exempted Maine waters.* This will maintain a level of protection within all state waters.
- *Maintain current exemption line.* Floating groundlines will be allowed within near shore parts of state waters as outlined in the Amended ALWTRP.
- *Low-profile groundline* is defined as a rope with a specific gravity of 1.02. This is the density of rope that data has demonstrated to have an average and maximum arc height of less than 1 meter (about a half a fathom or 3 feet) off the bottom. The concept of low-profile rope has been a contested topic for a number of years in the ALWTRT forum. After five years of research and eight field tested products of low-profile line, DMR has successfully developed a product that significantly reduces the arc height of groundlines while allowing a very low level of flotation as required for operational Maine fishing practices. The full report on these results along with other products that were tested simultaneously will be available for the ALWTRT meeting in the spring of 2008. Additionally, the state waters low-profile area will require 10 fathom groundline maximums. This length will maintain arc heights less than 1 meter and ensure that while gear is trawled up there isn't an increase in overall amounts of rope in the water (with the increase in the number of groundlines).

- *Uniquely marked*. Low-profile groundlines will have a manufactured core tracer for enforcement and as a means of assessing the rope in the event of an entanglement.
- *Sinking groundline in Mount Desert Rock State Waters.* Mount Desert Rock State waters will maintain sinking groundlines due to the occurrence of large whales within the area on an annual basis.
- *Singles ban* and the requirement to have only one buoy for 5 traps or less will greatly reduce the number of endlines within the state waters low-profile area, therefore reducing risk of entanglement to whales.
- *Adopt into state rulemaking.* All proposed measures will be adopted by state rulemaking for enforcement purposes and for the timely implementation of the risk reduction benefits.
- *Low-profile in federal area with a maximum length of 25 fathoms.* Greater than 10 fathom groundline length is needed in this area to account for safety issues related to the greater depths. Data shows that while float rope arc heights increase with length, there was no difference with low-profile ropes. Arc heights of less than one meter will still be maintained in this area.

Areas Selected

The proposed low-profile areas were selected based both on the operational need for some flotation in groundlines as well as the best available data on whale sightings in the NGOM (Figure 2). Using this data, state waters around Mount Desert Rock were determined as a sinking groundline area due to the annual occurrence of large whales in that area (Figure 2). Additionally, Lobster Zones E, F and G do not include any federal waters in the low-profile proposal due to the annual occurrence of large whales closer to shore in these Zones as well as the historic locations of DAM closures (Figure 3). All of the proposed areas are enforceable by Maine Marine Patrol. This includes existing pocket water boundaries or by use of Loran lines (Figure 1).

Timeline

Upon favorable consideration of this proposal, DMR will immediately begin rulemaking to adopt all measures into state regulations. The State of Maine APA process takes approximately ninety days, and DMR anticipates that all measures will be in place by the October 5, 2008 deadline as specified in the Amended ALWTRP.

Enforcement

State rulemaking authority will allow for the Maine Marine Patrol to enforce the proposed Amendment as part of Maine's Joint Law Enforcement Agreement with NOAA Fisheries. Maine Marine Patrol has documented a compliance rate of all State ALWTRT regulations greater than 97% and 95% in the Maine enforced DAM Zones. Marine Patrol will continue a high level of at sea enforcement. Unique tracer cored marking of low-profile line will enable simple and effective enforcement.

Contingency Plan

Maine currently holds authority to disentangle minke whales, and the trained industry and Marine Patrol disentanglement team has successfully performed multiple minke whale disentanglements. Training is on-going and DMR will continue to collaborate with NOAA Fisheries and Provincetown Center for Coastal Studies to increase training levels and offer any stand-by and disentanglement support necessary in the event of a humpback, finback, or right whale entanglement.

All low-profile gear configurations and associated marking will be adopted through the state rulemaking process.

DMR is currently conducting research to better assess the entanglement risk associated with low-profile groundline and endlines. This research includes CTD and plankton surveys throughout the NGOM to assess the location, abundance, and depth of large whale prey. Additionally, DMR, Ocean Works Group Inc. and Woods Hole Oceanographic Institute are planning a 2008 tagging study to determine dive and foraging behaviors of humpback, fin and right whales in Maine inshore fishing areas.

In the unlikely event of a verified (by the NOAA Fisheries gear team) entanglement in low-profile line, DMR will work with NOAA Fisheries to analyze the specific entanglement and reassess the areas in which low-profile line are allowed. The results of this analysis will determine potential modifications to the specific low-profile area.

Justification and Methods

Baseline

Baseline numbers and amounts (miles) of rope for endlines and groundlines were calculated using the 2006 DMR Vertical Line Survey. To accomplish this, trap configurations were taken from each Lobster Management Zone (A-G) for both 0-3 miles and 3-12 miles in the months with the highest number of endlines recorded in those areas. For example, Zone A had a peak in Aug. for 0-3 miles and in Nov. for 3-12. This information can be found in the vertical line report given to the ALWTRT at the Dec. 2006 meeting or on DMR's website. The number of traps in each configuration was extrapolated out to the entire population of lobstermen in each Zone using the most recent numbers available for trap tags purchased. These numbers were then scaled to the size of the State and Federal low-profile areas in each Zone using calculated area estimates. For example, 42% of Zone A's area from 0-3 miles would fall within the proposed low-profile area, the rest is within the exemption line. Using that area percentage, 42% of the gear reported within 0-3 miles from shore would fall within the proposed low-profile area. Area estimates were obtained using ArcGIS's ArcMap program. The number of total endlines in each Zone was then calculated by assigning one line to configurations including singles, pairs, triples, and fours, and two lines to the remaining larger trawls. To get a sense of how much rope the number of endlines translates to, the amount of rope in miles was calculated based on the average depth in an area. Using ArcMAP, twenty depth measurements in each lobster Zone were taken from within each of the state and federal proposed low-profile areas and averaged together. The length of an endline in each area was calculated to be 33% longer than the average depth to compensate for tides. The length was then converted to miles.

A baseline was also calculated for the number and amount (miles) of groundlines in these areas. The aggregate numbers for groundlines present in each area were simply calculated from the configurations in the survey, one groundline for pairs, two for triples and so on and multiplied out as done above to cover all trap tags purchased within the proposed low-profile area. This data was also translated into miles. Average groundline lengths were estimated in each Zone from a DMR survey done in 2003 that documented gear configurations using a remotely operated vehicle (Table 1). The number of groundlines in an area was then multiplied by the average length and converted to miles.

Sink line scenario

Following the calculation of the baseline, DMR compared some broad changes in gear configurations in the proposed low-profile areas to those original numbers to illustrate how they would change as lobstermen break up their gear to use sinking groundline as now mandated in the ALWTRP. These included scenarios with up to 6 trap trawls being broken up to singles in state waters and up to 6 trap trawls being broken up into pairs in federal waters (already a singles ban in place in federal waters). The following scenarios were calculated:

- *Up to 3's* – In state waters any traps configured as pairs or triples were broken up into singles. In federal waters any traps configured as triples were broken up into pairs. The numbers and amounts of endlines were then re-calculated as described above.
- *Up to 4's* – In state waters any traps configured as pairs, triples, or in four trap trawls were broken up into singles. In federal waters any traps configured as triples or four trap trawls were broken up into pairs. The numbers were re-calculated as described above.
- *Up to 5's* – In state waters any traps configured as pairs, triples, or four or five trap trawls were broken up into singles. In federal waters any traps configured as triples, or four or five trap trawls were broken into pairs. The numbers were re-calculated as described above.
- *Up to 6's* - In state waters any traps configured as pairs, triples, or four, five or six trap trawls were broken up into singles. In federal waters any traps configured as triples, or four, five or six trap trawls were broken into pairs. The numbers were re-calculated as described above.

Low-profile scenario

One scenario was also done to show the changes in endlines and groundlines due to the requirements of the low-profile proposal. Numbers and amounts of rope for both endlines and groundlines were calculated as described above with the only configuration change occurring in the state proposed low-profile areas where singles will be banned. In these areas singles were assumed to change to pairs. During the groundline calculations, the lengths used to calculate the miles of rope in a given area were the maximum allowed under the low-profile proposal (10 fathom in state waters and 25 fathom in federal waters).

Results and Discussion

Baseline

The numbers of endlines and groundlines in the proposed areas were calculated as discussed above from the 2006 DMR Vertical Line Survey. That survey yielded information regarding the configurations of gear used in different areas of the coast. It is within these configurations that the information on the impact of the impending sinking groundline mandate can be found. Table 2 consists of a breakdown of gear configurations by lobster management Zone (A-G) and proposed low-profile areas (state, federal and both combined). These numbers represent the current configurations before the October 5, 2008 deadline. The results that are immediately apparent are the large proportions of shorter sets of gear, namely singles, pairs, and triples in state waters (24, 57, and 25% respectively) and pairs in federal waters (32%). In state waters some Zones (such as B and C) have very high densities of shorter gear configurations with 83 and 92% of their gear make up of pairs respectively. Federal waters follow closely in Zones B and D with 81 and 62% respectively. These gear configurations were then calculated to determine the baseline for the numbers and miles of endlines and groundlines in each area. Table 3 contains the current calculations for endlines and groundlines by lobster Zone and low-profile proposed areas. The low-profile areas make up about 31% and 16% of state and federal waters (out to 12 miles) respectively. Within those areas there are a total of 615,406 endlines currently, which translates to about 26,784 miles worth of rope. Groundlines account for 7,062 miles of rope collectively with a total of about 514,937 lines. These numbers are also broken down by Lobster Management Zone and proposed area.

Endline increase

Maine lobstermen commented throughout the rule making process that some flotation is needed in groundline to fish the rocky and tidal habitat that is common along Maine's coast. An example of that bottom type can be seen in Figure 4. Much of the near-shore coast is predominately rock. Combined with extreme tides, fishing with sinkrope groundlines in these areas presents an operational challenge due to frequent hang downs, safety concerns and economic hardships due to gear loss and replacement costs. Data assembled by the Maine Geological Survey in 1996 (Barnhardt et al.) taken by side-scan sonar, seismic reflection and bottom samples are used to elucidate the bottom topography for near shore Maine. Table 4 is a representation of what is seen on the map in Figure 4. The breakdown of a predominately rocky bottom by lobster Zone shows percentages up to 54% in Zone E, meaning of the bottom samples taken in that Zone, 54% consisted of predominately rocky habitat. These numbers translate to 48% coast wide across all Zones. Additionally, when one considers other habitat types (gravel, sand and mud) that also contain some rocky habitat you get up to close to 60% in Zone E and 52% coast wide. This factor coupled with the lobstermen's need to keep trawl lengths relatively short to efficiently fish this type of bottom will result in a wide spread change in fishing practices. The high densities of short gear configurations that are seen in the baseline information in Tables 2 and 3 will be broken up into singles in state waters and pairs in

federal waters. Fishing singles or pairs in these areas eliminates or decreases the need to use sinking groundline and allows lobstermen to work hard rocky bottom with far less chance of losing gear due to chafing and excessive wear.

The reconfiguring of gear to predominately singles will result in a significant build up in the number of endlines seen in these areas. It is DMR's intent to prevent this build up with a holistic plan that accomplishes two goals: allows minimal flotation in groundlines for use in specific areas of the state (see Figure 1) and provides a greater reduction of risk of entanglements to large whales in the NGOM than the Amended ALWTRP. In this effort DMR has calculated the baseline numbers for the amount of rope in the proposed areas of change as well as tried to simulate what a few different scenarios of configuration changes would look like. Table 5 presents the results of several of these scenarios. Currently there is a total of 26,784 miles of endlines in state and federal proposed low-profile areas combined. If the current sinking groundline mandate remains in place in these areas the increases in endlines due to a build up of singles would range from 52 to 63% depending on how vast the change-over is. If only pairs and triples change to singles in the state area and triples change to pairs in the federal area then there would be a 52% increase in the number of endlines resulting in a total of 40,780 miles of rope (a 13,995 mile increase). Changes in gear configurations were calculated for up to six trap trawls changing over to singles or pairs. This worst case scenario resulted in a 63% increase for a total of 43,646 miles of rope (a 16,862 mile increase). The information in Table 5 is also broken up by low-profile area. The majority of the configuration changes occur in the state low-profile proposed area due to the density of gear there, up to a 68% increase in endlines.

Low-profile proposal

A significant risk reduction component of Maine's proposed plan is the prohibition of gear fished as singles in the state low-profile area (a ban on singles already exists in federal waters). Table 6 contains the calculations for the impact that the low-profile proposal will have on the amount of rope in the water in these areas. Prohibiting singles in the state low-profile area will result in a total reduction of 21% in the number of endlines compared to the current baseline numbers (a decrease by 4,782 miles of rope). It is important to note that the numbers of endlines and groundlines are related. As there is a decrease in the number of endlines due to trawling up gear, there is an opposing increase in the number of groundlines in the water. The proposed Amendment includes maximum length requirements for groundlines in the low-profile areas. Although there will be an increase in the number of groundlines in the water, the overall amount of rope will actually decrease by about 342 miles or by about 5%.

Additional Justification

The ability to accurately measure risk reduction is a critical issue, especially with minimal data. Figure 2 shows the cumulative sightings in DMR's database of all three species of whales protected under the ALWTRP from 1967 to present. Table 7 shows a breakdown of these sightings in number format by area presented on the map in Figure 2.

There are a total of 1,126 sightings from shore out to 12 miles of all three species. Of those 1,126 sightings 121 or 11% of them occur within the exemption area that was defined in the Final Rule. By comparison only 9% of those sightings occur within the proposed state low-profile area and only 0.6% occurs within the federal low-profile area (both areas considered together result in 9% of the total sightings). Conversely, the sightings that occur outside of either proposed area make up 80% of the total sightings out to 12 miles. While there seems to be significant percentages of sightings within some Zones (50 and 46% within the state low-profile areas in Zones C and D respectively), there are actually relatively few sightings occurring in these Zones compared to neighboring Zones (a total of 62 and 71 compared to over 300 in both Zones B and E). DMR is confident that the proposed low-profile areas are of low entanglement risk to large whales in the NGOM. There are fewer sightings in these areas than in the area determined to be exempt from risk reduction measures. The proposed Amendment effects a significant reduction in the risk of entanglement to large whales in the form of a reduction of rope in the water. Maine's proposal for low-profile use areas not only prevents a substantive rope build up but reduces rope from current levels, something the current ALWTRP does not accomplish.

Low-profile rope

Low-profile rope is defined as having a specific gravity of 1.02, very slightly different than sinking rope's specific gravity definition of 1.03. The field trials that DMR has conducted document that rope of this density will maintain an arc height, average and maximum, below one meter off the bottom. Table 8 shows some preliminary results of the low-profile rope that DMR has field tested in comparison to standard floating line. Twelve trials were set up in six different areas of the coast. From those twelve sets the low-profile product had an average arc height of 0.23m with a maximum of 0.63m (using 10 fathom length groundlines). Float rope had an average arc height of 2.99m and a maximum height of 7.48m. Low-profile rope is an average arc height reduction of 92% from the current standard. Additionally, there is no difference when the length of the groundline between traps is increased. Low-profile rope maintains at an average of 0.21m above the bottom when the length is increased from 10 to 18 fathoms while float rope increases to 5.28m. Figure 5 is a representative graph of the low-profile rope set along side standard float rope (both 7/16" diameter) in both 10 fathom and 18 fathom length groundlines through all tidal cycles. The low-profile rope proposed by DMR maintains its height below one meter through all tides and regardless of length, while float rope fluctuates broadly. Comments from lobstermen field testing this rope have been very positive. The final data is currently being processed, analyzed and will be available in a full report prior to the spring 2008 ALWTRT meeting.

Research

Large whale foraging and diving behavior over rocky and tidal habitats must be conducted in the NGOM in light of some questions raised over the actual risk reduction achieved by low-profile lines. Although work has shown regular feeding of right whales within the engybenthic layer near the bottom in Cape Cod Bay and other habitats made

up of sand and mud, little is known about how right and other large whales utilize the water column during feeding or alternate behaviors over a hard and variable substrate. Specifically, the depth at which a large whale will dive is of vital importance when assessing the use of line that does not lay flat on the bottom. To this point, DMR conducted a CTD and plankton survey in 2007 in the proposed low-profile use areas to begin to understand the potential for large whale prey to aggregate near the bottom and at what depth that might occur. Data from this survey are currently being analyzed and will be available in a report for the spring ALWTRT meeting. This report will also be made available on DMR's webpage. These data will be coupled with historic CTD, plankton trawls, and prey data from datasets within the state sponsored inshore trawl survey to understand the historic trends. DMR and the Maine lobster industry fully comprehend the importance of understanding whale behavior when trying to mitigate the risk of entanglement in both groundlines and endlines.

DMR plans to conduct the following research in 2008:

- Expanded vertical line survey to assess the densities of gear within the new fishing Zones seasonally (exemption area, state and federal low-profile areas)
- Endline entanglement risk mitigation
- D-tagging humpback, fin and right whales in coastal fishing habitats
- Monitoring known right whale seasonal habitat around Mount Desert Rock with water column and prey sampling
- Conduct expanded state-wide right whale prey survey
- Opportunistic sampling of zooplankton by local whale watch and fishing boats in the event of a right whale sighting
- Expansion of the current state-wide trained sightings network to include additional industry members
- Expansion of the current state-wide trained disentanglement network to increase the number of higher level trained personnel in the state.
- Assessment of potential areas of increased risk of entanglements by mapping the distribution of gear taken from the DMR conducted endline surveys, sightings of large whales, prey data and oceanographic variables
- Upgrade the GIS database and web page to include additional sightings and correct for effort using sightings per unit effort (SPUE)
- Analyze historic fish trawls in Maine waters from the DMR inshore trawl survey and overlay what is known about the distribution and abundance of humpback and fin whales.

Future plans that are pending funding include:

- State-wide, near-shore aerial sighting surveys conducted year round and coupled with boat response for opportunistic sampling, including CTD drops and plankton trawls, as well as photo-identification and potentially isotope and population genetic studies.

Information learned from these studies will fill in gaps in knowledge about processes that drive the distribution and abundance of prey in Maine waters as well as the distribution and behavior of large whales over rocky and tidal habitats. DMR encourages the scientific community to expand tagging and other relevant research projects out of known habitats to include areas such as the NGOM where little is known about the biology of these endangered species.

Works Cited:

Barnhardt, W.A., Belknap, D.F., Kelley, A.R., Kelley, J.T., and Dickson, S.M., 1996, Surficial geology of the Maine inner continental shelf (Series): Maine Geological Survey Maps 96-7, 96-8, 96-9, 96-10, 96-11, 96-12, 96-13, 1:100,000 scale.